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Antibiotic Susceptibility Assessment of *Helicobacter pylori* Isolates by Disk-Diffusion Method

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Abstract
Helicobacter pylori (*H. pylori*) infection is tightly associated with gastrointestinal disorders such as chronic gastritis, peptic ulcer, gastric MALToma, and gastric cancer. Decreased antibiotic susceptibility in *H. pylori* is a worldwide problem. Our objective was to determine in vitro antimicrobial susceptibility of *H. pylori* isolates obtained from gastric mucosa biopsies of children with *H. pylori*-associated gastroduodenal diseases using disk-diffusion method. A total 76 biopsy specimens were studied; antibiotic susceptibility was assessed in case of 30 children in whom *H. pylori* was revealed by bacteriology. The maximum resistance of *H. pylori* isolates was revealed to clarithromycin with nine resistant isolates (30.0%). The rate of resistance to metronidazole, amoxicillin, furazolidone, tetracycline, and levofloxacin was 23.3, 33.3, 16.7, 25.0, and 16.7%, respectively. Multidrug resistance was detected in 20.0% of *H. pylori* strains. The high prevalence of resistance to antibiotics used in eradication therapy is becoming a problem which needs eradication therapy regimen use based on regional *H. pylori* resistance rates.

Keywords *Helicobacter pylori* · Children · Antibiotic susceptibility · Disk-diffusion method

1 Introduction

Helicobacter pylori (*H. pylori*) infection is tightly associated with gastrointestinal disorders such as chronic gastritis, peptic ulcer, gastric MALToma, and gastric cancer [1].

Almost half of the world's population are infected by *H. pylori*, and its prevalence is highly variable. High incidence of *H. pylori* infection has been observed in Africa: 75–77% in Ethiopia [2, 3] and 93.6% in Nigeria [4]; in Asia: 89% in Iran [5], 62.3% in Kazakhstan [6], and about 60% in Korea [7]; and in the Middle East: 82.5% in Turkey [8]. *H. pylori* infection prevalence is less among the population of Saudi Arabia—36.8% [9], and in Canada—about 30% [10].

The number of infected children also varies in different regions. High level of *H. pylori* infection in children is observed in Africa and Asia: 39.6% of children aged 1–10 years in Madagascar [11] and 40.7% in Nigeria [12]; 64% of children aged 10 to 19 years in Kazakhstan [13], 82% in Iran [5], and 50–80% in the Middle East (Saudi Arabia, Egypt, Turkey) [14–17]; and 35% of children aged 7–14 years in Latin America are infected [18]. The prevalence of *H. pylori* among children in economically developed countries is significantly lower—about 12.2% in the USA [19] and 7% in the UK [18].

A complete data on *H. pylori* prevalence among adults and children in Russian Federation is not available, only a few regional studies were conducted. *H. pylori* was found to be prevalent in 88% of adult population in Moscow [20] and in 64% in Smolensk [21]. Several regional studies evaluating prevalence of *H. pylori* in children and teenagers were conducted in Siberia, Perm, Ufa, Krasnoyarsk, and Kazan, indicating a high level of *H. pylori* infection up to 71% in Yakutia [22], 55.2% in Tuva [23], 48% in Perm [24], 82.3% in Ufa [25], 90% in Krasnoyarsk [26], and 59.3% in Kazan [27].

According to Maastricht V (2015), ESPGHAN and NASPGHAN (2010) recommended that *H. pylori* eradication therapy should be prescribed considering the level of *H. pylori* antibiotic resistance; particularly, the level of *H. pylori* clarithromycin resistance should not exceed 15% to be able

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